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The Classical Weekly

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LIGHT ON ANCIENT PAINTING

Roman Frescoes and the Originality of Latin Literature

The Teachers College Record for November, 1923 (24.51–60) contained an article entitled Notes on Permanent Painting, by Charles J. Martin, Associate Professor of Fine Arts, Teachers College, and Arthur C. Henry, former student of Fine Arts, Teachers College. The first part of this article may be of interest to some readers of THE CLASSICAL WEEKLY, because it throws light on that very interesting subject, painting among the ancients, especially as seen in the frescoes, at Pompeii, Rome, and elsewhere.

Probably the most neglected side of the training of the art student and art teacher is that which has to do with his materials and their manipulation; the "craftmanship" of his art. Even in the art schools where, if anywhere, one might expect to find some attention given to the "craft" of painting, it is only within the last few years that a beginning has been made in instructing the art student in the selection and use of materials.

In the "golden age" of painting a thorough knowledge of the craft was the foundation upon which the artist built his creative design. In those early days the apprentice ground colors and prepared canvasses, oils and varnishes, thus acquiring a first-hand and practical knowledge of the materials which he later used in his painting.

The fact that the artist and the art student can today purchase materials in a form ready for immediate use may be a contributing cause of his apparent indifference to this side of his work.

It is only rarely that we find artists with a working knowledge of chemistry and still rarer to find chemists interested in painting on its creative side. It was the co-mingling of these two interests which led to a series of experiments with various oils and pigments and their admixtures, and finally to the writing of this article.

One of the writers, before taking up the study of painting, was a metallurgical chemist. He has found that many students are confused concerning the properties of their colors and even more uncertain after attempting to read technical books on the chemistry of paint. This article is therefore an attempt to answer the questions most frequently asked by beginners in oil painting.

The life of a picture varies from a few weeks to something over ten thousand years in the paintings of palaeolithic man in the caves of the Dordogne and the Pyrenees. The deterioration or complete ruin of many great paintings of the past few centuries, or even of the past half century, is regretfully noted to-day, and the fading or disastrous altering of pictures after a few months or years, if proper care is not taken to paint only with reliable materials, is a common source of trouble to present-day artists and students. Some of the most ancient paintings known—animal pictures by pre-historic man, wall paintings in Pompeii and in the tombs of Egypt, panel portraits of the Graeco-Egyptian school, and the lasting works of Van Dyck, and Rembrandt—have shown remarkable preservation while many pictures less than a century old have altered seriously. Hence the tradition has grown that the ancients possessed some mysterious secrets of permanent painting.

The explanation of the apparent paradox is simple when we consider the pigments used by the earlier painters.

The first pigments were colored minerals. The cave man used yellow, red, and brown ochres, and a black made of soot or charred bone. In the course of time other pigments were added to the list: vermilion found native as the mineral cinnabar, whites made from pulverized gypsum and limestone, green earths such as celadonite, the yellows and red of orpiment and realgar, and the blues and greens of the copper minerals azurite, chrysocolla, and malachite. Of these minerals, the ochres, the whites, and the green earths do not alter in ages, vermilion darkens only when exposed to strong sunlight, and the copper greens and blues hold well unless in contact with atmosphere that contains sulphur gases.

The Egyptians manufactured a beautiful and permanent blue by fusing copper with lime and sand, and this pigment has been identified in paintings on the walls of tombs as ancient as 3,500 B. C. and in the frescoes of the Cretan palaces of 1,500 B. C. The one durable organic pigment known to the ancients was madder.

The lasting qualities of the ancient paintings are due to the inorganic nature of the pigments employed, and to the care that was always taken to avoid such mixtures as malachite with orpiment which interact chemically.

With the exception of Egyptian blue and Tyrian purple, neither of which is necessary, we have at present all the pigments used by the ancient painters, with the addition of others as permanent, purer and more brilliant. The lack of permanence of many modern paintings has come through the introduction and haphazard use of many new pigments, without sufficient knowledge of their permanency or tendency to react chemically when intermixed. There are something over two hundred pigments on the market to-day, many of which should have no place on the palette of the artist or student who wishes his work to last.

The chemistry of painting has been thoroughly studied and published in such authoritative books as Field's *Chromatography*, Sir A. H. Church's *The Chemistry of Paints and Painting*, and Maximilian Toch's *Materials for Permanent Painting*, but art students, especially those who have no knowledge of chemistry, are apt to be confused and dismayed by the mass of technical reading, and continue to work with a more or less chance knowledge of their colors, with the result that their color boxes contain notoriously fugitive pigments, and mixtures that interact disastrously are frequent.

In the fourth paragraph from the end of the foregoing quotation, the authors have in mind, I suppose, the Homeric *kyanos*. If so, I should like to know what Greek scholars think of the paragraph. The latest utterance on the subject available to me in my own library is the article **Κύανος**, in A Lexicon of the Homeric Dialect, by Richard John Cunliffe (Blackie and Son Limited, Glasgow, 1924):

Glass paste or enamel coloured with a pigment doubtless to be identified with the pigment of brilliant cobalt hue largely used in the palace at Cnossus (see Sir Arthur Evans's *The Palace of Minos*, 1921, vol. 1. p. 534).

I like books to be complete, so far as they go. It would have been easy for Mr. Cunliffe to add a line or two on the nature of the "pigment of brilliant cobalt hue". However, he did far better than Mr. H. R. Hall did in his Aegean Archaeology (London and New York [G. P. Putnam's Sons], 1915). His two allusions to *kyanos* run thus:". . .*kyanos*, or blue glass paste . . ."(198), ". . .a blue paste formed of pounded lapis-lazuli-like glass, the Homeric *kyanos*. . ." (204). Of the nature or source of the blue color he says not a word. The Cambridge Ancient History (see THE CLASSICAL WEEKLY 18.54–55) does not mention *kyanos* at all.

In Classical Philology 12.143–157 (April, 1917), I published an article entitled References to Painting in Plautus and Terence. On pages 154–155 I discussed in detail Plautus, Asinaria 746–767, a very interesting passage which refers either to the laying of wax over a picture to preserve it, or to encaustic painting.

Finally, I wish to call attention to part of a very valuable chapter in a certain book, which constitutes the most suggestive and effective presentation of the originality of Latin literature I have ever seen, though the author of the chapter was not thinking at all of the originality of Latin literature. The book, by Gaston Boissier, is known, in its English version by D. Havelock Fisher, as Rome and Pompeii: Archaeological Rambles (G. P. Putnam's Sons, 1896). The pages I have in mind (Chapter VI, Sections III and IV, pages 370–419) deal with The Frescoes of Pompeii According to Doctor Helbig's Works (the reference is to W. Helbig, Wandgemälde der vom Vesuv Verschütteten Städte Campaniens, and Untersuchungen Über die Campanische Wandmalerei). I gave the substance of the chapter, with incidental comments, in the course of a paper entitled The Originality of Latin Literature (The Classical Journal 3.251–260, 299–307: see pages 306–307):

Boissier, in a most suggestive chapter, has discussed, after Helbig, the frescoes of Pompeii. Of the 1,968 paintings catalogued by Helbig in 1868 over 1,400 are connected with mythology, that is, they represent adventures of the gods or legends of the heoric age. The love of Jupiter for Danaë, Io, Leda, or Europa, the pursuit of Daphne by Apollo, the story of Mars and Venus, of Venus and Adonis are the themes that meet the eye most frequently. We note at once a certain resemblance between these themes and those of various Latin writers, particularly the writers of didactic poetry or of the elegy who sing of mythology and love. This is due to the fact that poets and painters borrow from the same source, the culture of the Alexandrian period. But there is a wide difference between them, a difference before which the resemblance already noted fades into nothingness. The poets found their best inspiration in the glorious history of Rome and became thereby truly national in spirit, Romans, not Greeks, however much they owe in detail to Greek sources; but for the painters that history had no meaning. It is said that of all the paintings at Pompeii but five or six show scenes from the *Aeneid*. Of these one, be it noted, is a caricature. A long-tailed monkey, wearing a coat of mail and encumbered by a sword, is carrying an old monkey on his shoulders and dragging a young monkey by the hand: it is Aeneas bearing his aged father from Troy and his son going with him *haud aequis passibus*. Another painting gives a scene from *Aeneid* xii. Aeneas has been wounded by an arrow shot by an unknown hand. He stands with one hand resting on a javelin, the other laid on the shoulder of his weeping son; the leech, aged Iapyx, is trying to pull out the dart. Above is Venus descending from the sky and bringing the herb which is to cure Aeneas. It is not a good picture. The attitudes are awkward, the whole is wanting in ease, and it is clear that since the subject was not familiar to the artist he did not treat it with pleasure or technical success. Themes of love, as already noted, are the prevailing themes of the Pompeian frescoes as they are of the representative poetry of the close of the Augustan Age; yet the Dido episode is only twice or thrice represented, whereas the Ariadne story has given rise to thirty or more works, some of large dimensions and of remarkable execution. That the Aeneid was well known at Pompeii is a commonplace. Since, then, people knew and esteemed Vergil, it is natural to suppose that they would gladly have had scenes from his writings painted in their houses. Why did not the painters gratify such tastes? Because their art had remained Greek, it was known to be shut up to its traditions and nobody required it to leave them.

After the foregoing paragraph, I wrote two others, as the conclusion of the paper, as follows:

One national literature may work upon another nation in two somewhat different ways. It may supply that other nation merely with models of style, or it may supply it with modes of feeling. We have the authority of a good scholar[1] for the statement that the "influence of German upon English literature in the nineteenth century was more intellectual and less formal than that of the Italian in the sixteenth and of the French in the eighteenth. In other words, the German writers furnished the English with ideas and ways of feeling rather than with models of style". Whatever may have been the nature of the influence exerted originally by Greek literature on the Romans, it would seem to be true that more and more that literature supplied the Romans merely with models of style.

Latin literature, then, in its highest forms is no mere imitation of Greek literature, but an independent development, founded, to be sure, on the basis of Greek literature, but in time emancipated more and more in the things of the spirit from Greek literature, making as effective an appeal to contemporary and later times as had ever been made by those Greek writers who in the same varied spheres had walked in the footsteps of those truly original geniuses who invented the various literary forms. The Romans, further, contributed one literary form, the satirical, in heroic verse. In the words of the distinguished scholar (Leo) to whose utterances this paper owes so much,

"In more than one sphere the Romans outdid their predecessors and threw them into the shade. Dante and Tasso, Milton and Pope, Corneille, and Racine and Holberg drank from living springs, native to Roman soil, not from pipe-lines laid to transfer the waters of Greece to the land of Romulus".

CHARLES KNAPP

[1] See Henry A. Beers, From Chaucer to Tennyson, 166.

TRAJAN'S DANUBE ROAD AND BRIDGE

I was greatly interested in the excellent study by Mr. Benjamin W. Wells of Trade and Travel in the Roman Empire I, which appeared in The Classical Journal 19.7–16 (October, 1923). In one passage the author mentions the rock-cut road built by Trajan along the Serbian bank of the Danube, above the Iron Gate, as a military approach to Dacia. In speaking of how the imperial engineers solved apparently insurmountable difficulties, he says (11): ". . .A road was carried through the Iron Gates as far as Orsova, at times on beams fastened to the sheer face of the cliffs and overhanging the river". However, the rapids known as the Iron Gate begin five miles below Orsova, while the rock part of the road in question is above that town. Many historians of Trajan's Dacian Wars have similarly mistaken the localities involved. Thus Duruy, in his History of Rome (V, Pt. 1, 234), regards the Iron Gate as comprehending that part of the Danube—including the defile of the Kazan—which extends from Drenkova to near Orsova, a distance of over fifty miles. Merivale (History of the Romans under the Empire, 7.190) makes the same mistake when, in speaking of Trajan's road, he says it "threaded the defile of the Iron Gate". For, while rightly placing the Iron Gate below Orsova, he wrongly locates the road in question. As I have visited the locality twice, perhaps a brief account of the road above the Iron Gate, and of Trajan's bridge below it, and of the use made of both in the Dacian Wars may be of service. In September, 1898, while en route for Constantinople, I started down the river by steamer from Belgrade, but, because of unprecedented low water, was compelled to disembark at the village of Omoldova, six and a half hours below Belgrade, and continue the rest of the way to Orsova, some fifty miles beyond, on a peasant's springless cart along the Zéchenyi road on the Hungarian bank of the river. Again, in August, 1907, I reached Orsova from Bucharest, and took the steamer against the current to Belgrade. On both occasions, and especially on the latter, I had excellent opportunities to view the rock-hewn road at close range.

Trajan's desire to restore the splendor of Roman arms seems to have been largely responsible for his idea of strengthening the chain of frontier defences on the Rhine and the Danube. Thus, if we are to believe Aurelius Victor[1], the Roman historian of the Caesars who lived in the reigns of Constantius and his successors, Trajan constructed a chain of military roads from the Main to the Black Sea—iter conditum per feras gentes, quo facile ab usque Pontico mari in Galliam permeatur. But the building of so vast a series of works must have been the labor of many years, beginning long before the Emperor's time. As governor, Trajan had already spent three years on the defences of the Rhine and the *agri decumates*, and later, after his accession, recognizing that the center of gravity of the Empire was further east, he turned his attention to the Danube. Here and there traces of these undertakings are visible. Thus, portions of a wall ascribed to Trajan still exist above Regensburg, extending from Eining, near the ancient Abusina, to Wiesbaden, while another line of fortifications can be traced on the lower Danube in the Dobrudja between Cernovada and Constantza. At intervening points many other Roman remains have been found, notably the scar left by the rock-hewn road in the defile of the Kazan, and the foundations of the bridge below the Iron Gate at Turnu Severinu. But the long course of the ancient line of defence to-day is far better marked by the surviving names of military posts and colonies along it.

The remnants of the road in question are first prominent below the Serbian village of Golubács—the ancient Cuppae—,which lies almost due south of Omoldova across the great island formed in this neighborhood by the forking of the Danube. Here is the picturesque ruin of a castle high on a rock, its seven towers visible for a long distance, the old fortress of Columba, or the 'Dove', which has given its name to the modern hamlet. It was here that the Greek Empress Helena was once incarcerated, and this fortress has been the scene of many a struggle between Christian and Turk. From Belgrade to this point the Danube is open and wide, in places reaching a width of two miles, its low-lying banks covered with forests and morasses. But the scenery gradually changes, as the river enters the highland district where the southernmost spurs of the Carpathians—the Szretinye mountains—reach the river in the great promontory of Kazan, and confront the northernmost outliers of the Balkans. For miles the river, which in geologic ages burst through these foothills, is confined by lofty cliffs in a narrow channel. Here begins the finest part of the Danube scenery, which is wild and impressive, the rocky banks at times being precipitous, and again sloping or broken by torrents. Moreover, a series of rapids, whose swirling waters beat against the cliff walls and remind us on a smaller scale of the rapids in the Niagara River, has, until recently, impeded navigation. The Hungarian government, as the result ultimately of the action of the Great Powers at the Congress of Berlin, in 1878, carried out at great expense engineering works intended to make the whole stretch of the river from Omoldova to Turnu Severinu, a distance of over sixty miles, navigable in all seasons, by making the bed of the river at low water at least two meters deep above Orsova, and three below it.

The first rapids of the series, known as the Stenka and continuing for 1,100 yards, are just above Drenkova, a town some miles below Omoldova. Here a rock bank, partly exposed, extended nearly across the river, which at this point is 985 yards in width. Nine miles below are the Kozla Dojke rapids of similar length, where two banks of rock caused a sudden alternation in the current, the river narrowing to a width of 170 to 330 yards. Two more rapids follow in close succession, the Isláz and Tachtalia, and six miles below Kozla Dojke are those of the Greben, which formed the most serious impediment of all to navigation. For here a spur of the Greben hills projected between two shoals, and the river narrowed to 300 yards, only to widen almost immediately to one and one-half miles. In the Greben

[1] De Caesaribus 13.

rapids are the remains of what appears to have been a Roman canal cut into the river bed. Seven miles further down are the Jucz rapids. The Austro-Hungarian engineers changed all these adverse conditions to river traffic by cutting canals 66 yards wide and six and one-half feet deep into the rock bottom of the river through the first four rapids, by cutting back for 167 yards the original face of the Greben rock and building below it a wall four miles in length along the Serbian shore, and by constructing both a canal and a buttress wall in the Jucz.

Below the last named rapids the river again widens to nearly a mile, and we soon pass the Serbian villages of Milanovács and Tricule—the latter marked by the ruins of three Roman towers. It is in this neighborhood that the famous pass known as the Klisura or Kazan—the latter word meaning 'kettle'—begins, some twenty miles above Orsova. The river's course is overshadowed by high cliffs, which at one point on the right bank form a mighty bastion over 2,000 feet in height, known as the Sterbeczu Almare. The narrowest part of the defile is opposite the Hungarian village of Rogach, where the river contracts to only 162 yards in width, and has a tremendous current, and is even said to reach the incredible depth of 150 feet.

It is here in the Kazan that the best traces of Trajan's road are seen cut into the face of the perpendicular cliffs. These remains are confined, for the most part, to a horizontal ledge which is from four to six feet in width and considerably higher, hewn from the rock a few feet above the river. However, a width at least twice as great was gained for the roadway by a wooden gallery built out over the water and supported by a framework of beams. Below the cutting are plainly visible the holes in the rock, placed at irregular intervals, into which the horizontal and slant beams were fastened which upheld the wooden platform. These holes are about nine inches square and eighteen in depth, and are placed at four distinct elevations. Chasms in the rock-wall were spanned by bridges, either of masonry or wood, of which there are no traces. It is not difficult to understand why only a portion of the road was hewn in the rock. The wooden gallery was not constructed merely to save expense, but rather to furnish a convenient tow-path for the passage of transports, and, furthermore, it could readily be destroyed in times of danger.

The defile of the Kazan ends opposite the squalid village of Ogradina on the north bank, some distance southwest of Orsova. Here, on the Serbian side, is the Tabula Trajana, as the modern inscription on the overhanging rock above it is called, one of the most important historical monuments along the Danube. The letters are cut into the limestone, the tablet being perhaps twenty feet above the water. While the inscription has been somewhat obscured by weathering and especially by the smoke from the fires of the Serbian fisherman, who for a long time have used the spot for their camps, it can still be fairly well made out. In recent years the level of the roadway has been raised by an inclined plane of masonry as a protection against the use made of it by boatmen. I quote a description of this tablet, which has been executed with some pretence to artistic elegance, from John Paget, who visited the region in the thirties of the last century[2]: "A winged genius on each side supports an oblong tablet protected by the overhanging rock, which has been carved into a rock cornice, surmounted by a Roman eagle. At either end is a dolphin". The inscription contains only six lines and reads:

IMP . CAESAR . DIVI . NERVAE . F
NERVA TRAIANUS . AVG . GERM
PONTIF MAXIMVS TRIB POT IIII
PATER PATRIAE COS III
MONTIBUS EXCISIS AMNIBVS
SVPERATIS VIAM FECIT[3]

It mentions Trajan as the builder of the road, and also indicates the approximate date of its completion. For in it Trajan is called Germanicus, a title which, we know, he and Nerva received in 97 A. D., but not Dacicus, a title which he received in the fall of 102, some months after the end of the First Dacian War. Furthermore, the Emperor is called consul for the third time, and tribune for the fourth. We know that he received his first consulship in 91, the second in 97, and the third in 99, the year after he became Emperor, and that he received his first tribunate in 97, and his fourth in 100. Consequently the tablet, in honor of the completion of the road, must have been erected sometime in 100 A. D., and in any case before the end of 102. Hence we may reasonably conclude that the road may have been ready for use or nearly so before the outbreak of the First Dacian War in the spring of 101. As the great bridge further down the river, to which the road later was extended, seems to have been begun in 103, Trajan may have had in mind the plan of constructing both road and bridge before engaging in his first struggle with the Dacians.

Until the Széchenyi road was completed in 1885 from the town of Bazias, which is an hour and a half above Omoldova on the north bank, to Orsova, the former frontier town of Hungary, the Kazan, we may be sure, had not been traversed by vehicles since soon after Trajan's day. And before that time we know that no road had been completed through the defile, although an attempt had been made to construct one. Thus, just below the rapids of Kozla Dojke, one still sees a plain tablet with mutilated lettering cut into the rock on the Serbian side, which Mommsen dated in the year 33 or 34 A. D.[4] It records that two Roman legions, the fourth Scythian and the fifth Macedonian, had been employed by the Emperor Tiberius in cutting a road at this point, *therefore* at least 67 years before Trajan finally carried the project to completion.

At Orsova, some distance beyond the exit of the defile, the surface of the river is 42 feet above the sea. From here the channel widens once more to nearly a mile, the river now having abruptly changed its direc-

[2]Hungary and Transylvania (London, 1839, Philadelphia, 1850. See Volume II, page 37 of the Philadelphia edition).

[3]C. I. L. III, I, No. 1699. Mommsen reads the last two lines as they are given above. The first publisher of the inscription, in Mittheilungen der Zentralcommission zur Erforschung und Arneth, Erhaltung von Baudenkmaeler, 83 f. (Vienna, 1856), read them as

MONTIS E FLUVII ANFRACTIBVS
SVPERATIS VIAM PATEFECIT.

[4]C. I. L. III, I, No. 1698.

tion, which from Milanovács had been northeast, to southeast, till five miles beyond, or 27 below the Jucz rapids, the last rapids in its course begin, the so called Iron Gate. The Turks were responsible for this name, which is the translation of Demir Kapu. They gave it to this locality not because of high banks along the river, since these have gradually approached to near the level of the water, but because of the fact that until recently the Prigrada rock bank nearly blocked the river's course at this point. In consequence of the name, these rapids have long had a sinister reputation as a dangerous bar to navigation, even though they have always been shot by ordinary open fishing-boats. The chief obstacle was rather the shallowness of the water. This difficulty has now been obviated by the cutting of a canal in the bed of the river near the Serbian shore, ten feet deep, eighty yards wide, and some 2,000 yards in length. In this neighborhood the remains of a smaller Roman cutting in the rock bed were long known. Buttress walls have also been constructed on either bank to restrain the swirling waters. This work was completed on October 1, 1898, just a few days before I took my first Danube journey. In consequence of these improvements the Iron Gate is now always open to navigation, except sometimes in winter when it is choked by ice. At the exit of the Iron Gate—which is nearly two miles in length—the river flows on smoothly, its low banks now separating northeastern Serbia from Rumania. It was in this neighborhood that Trajan built his bridge.

Of all Trajan's military bridges, including those over the Rhine near Mayence, at Chemtou in Tunis, and two in Spain, one of which crossed the Tagus at Alcantara, and that over the Tamango at Chaves in Galicia, this one across the Danube was by far the most impressive. We have a very brief account of it in Xiphilinus's epitome of Book 68 of Cassius Dio's Roman History[5]. As the Roman historian was legate of part of Pannonia in the year 227 A. D., he may actually have seen the bridge in its then state of ruin. He says it was supported by twenty stone piers, which were 150 feet high, 60 broad, and 170 apart; the piers were connected by arches. He adds that in his day only the piers remained standing, and afforded no means of crossing. Therefore it seemed to him 'as if they were erected for the sole purpose of demonstrating that there is nothing which human energy cannot accomplish'. Both Dio and the Byzantine historian Procopius record that Apollodorus of Damascus was the architect, the latter also adding that in his day, in the sixth century, the channel of the river was obstructed by the ruins[6]. Dio says further that Apollodorus planned Trajan's Forum with its buildings at Rome, and both he and Spartian record his death at the hands of Hadrian[7]. Aurelius Victor, who was governor of part of Pannonia under Julian, and Tzetzes, the twelfth century grammarian of Constantinople, give other details about the bridge, the latter mentioning that Apollodorus constructed an island in the river's bed[8]. If the architect's account of his work had survived, we could more easily refute some of Dio's exaggerations. Instead of the 'violent and deep' current of the river, whose channel is 'full of eddies', the Danube at this point is nearly three-quarters of a mile wide and relatively shallow, and its current is fairly gentle. Of course conditions may have somewhat changed since Dio's time, since it is well known that the Danube is an example of what the geologists call a dying river. The height of the bridge, 145½ English feet[9], seems also exaggerated, since the low banks on either side would have made such an elevation not only unnecessary, but objectionable. To be sure, the bridge at Alcantara, which is still standing, is 197 feet high, though only 616 feet long with its six arches[10], but there such a height was absolutely necessary. Only in the number of piers, and in their width and intervals, can Dio be shown to have been nearer the truth. In any case, Trajan's Danube bridge was a unique feat of ancient construction, and has not been duplicated in this part of the world in modern days, since the last bridge down the Danube is still the one built between Buda and Pesth in western Hungary, some 300 miles upstream.

The remains of the bridge can still be seen in the bed of the river at low water just above Turnu Severinu in Rumania, a town near the site of the Roman outpost Drobetae, the first station on the road which Trajan later constructed between the Danube and Apulum (Karlsburg) in Upper Dacia. Turnu Severinu is between six and seven miles below the exit of the Iron Gate, and consequently about thirteen below Orsova. Here, around the year 246 A. D., Severinus, governor of Moesia under Philip the Arab, built the Turris Severina, which gave to little Wallachia down to 1247 its name Terra de Severinu. Near this point, then, the huge bridge was thrown over the river to Egeta on the opposite bank, where, down to the fifth century, at least a part of the thirteenth legion (Gemina) and of the river fleet was stationed. At present the Turkish village of Feth Islám—very near the larger town of Kladovo—occupies the site of Egeta. All that is now left of the bridge is a shapeless mass of masonry some twenty feet high on either bank and between these and the water's edge broken walls rising to the height of the banks of the river. These structures are doubtless the remains of the buttresses from which the end arches of the bridge sprang. And in the bed of the river in a line between these ruins are clearly visible, projecting two or three feet above the surface in low water, the remnants of the foundation piers. Near the middle of the river is a low island which occupies the space of perhaps four piers; some believe this to be the remnant of the artificial island constructed by Apollodorus. Froehner shows nineteen such substructures exclusive of the end buttresses[11]. Even fragments of the wooden super-

[5] 68.13.1–6. Wiphilinus wrote in the reign of Michael VII (Ducas), 1071–1078 A. D.
[6] De Aedificiis 4. 6.16.
[7] Dio 69.4: Spartian, Vita Hadriani 19.
[8] Victor, De Caesaribus 13.4; Tzetzes, Chiliades 2.67.
[9] We gain this figure by using Dörpfeld's computation of the Graeco-Roman foot as .296 of a meter, or about 11.65 English inches: see Athenische Mitteilungen, 7 (1882), 282.
[10] See Duruy, History of Rome, V, Pt. 1, cut opposite page 274; and C. I. L. II, Nos. 759 and 762.
[11] See diagram in La Colonne Trajane, (1865), opposite page 133 (the second edition, with one volume of text and four of plates,

structure were found in 1858 by Aschbach, who was in charge of the Austrian engineers who carefully studied the remains[12]. The intervals between the piers, which Dio says were 170 feet—or 165⅓ English feet—probably reckoned between the axes, average 170¼ feet, or from the outer corners 110¼ feet. The piers which Dio gives as sixty feet—58⅓ English feet—in width are really, according to Froehner[13], from 45–47 feet long and from 69–72 feet wide. Such enormous piles of masonry, constructed of *opus incertum* and encased in regular courses of hewn stone, were deemed necessary not only to uphold the arched roadway, but to withstand the pressure of water and ice.

Besides these meager remains we also have several representations of the bridge on Roman works of art, which show that the framework of arches and roadway was of wood, as indeed we should expect for spans of such size. Thus the bridge is partly shown on one of the scenes from the band of reliefs which still decorates the Column of Trajan at Rome. Here is depicted a sacrifice which is apparently in commemoration of the completion of the structure. In the foreground stand the Emperor and several others—among whom Cichorius believes he can identify Hadrian, who at that time was one of Trajan's generals, and Apollodorus, the architect—around an altar, where a priest stands ready to slay a sacrificial ox. In the background we see five square pillars and five arches of the bridge, and the roadway with its long balustrade of wood[14]. This roadway is reached from the Moesian side by a stairway leading up through a monumental gateway, while at either end of the structure a fortress is represented. Another scene from the column[15], which represents the Roman army marching down a short inclined bridge, has been interpreted by Cichorius as the Dacian end of this Danube bridge, as it gradually descended to the shore. On the basis of the statement by Procopius already mentioned that Apollodorus constructed an island in the river bed, together with another in a letter written by the younger Pliny (8.4) to Caninius, which speaks of 'rivers turned into new channels', the German scholar believes that a canal was laid out at this end of the bridge to take off a portion of the water and thus to reduce the river's current. It is this canal, then, which he finds represented on this second scene, and from it he has reconstructed his idea of the bridge[16]. Of course there is no trace of any such canal at present, and most investigators believe that Pliny's statement refers merely to Trajan's diverting of the course of the Sargetia (Strehl), on which Sarmizegethusa, the Dacian capital, was situated, in order to find the treasure of Decebalus, which was said to be hidden in the bed[17]. On the reverse of a large bronze medallion in the Cabinet des Medailles in Paris, one large arch of the bridge is shown[18], and several coins of Trajan show fifteen arches of the bridge, and the statue-crowned towers at either end[19].

The bridge seems to have been built between the First and Second Dacian Wars, being completed by 105 A. D., in good time to transport troops across the river at the outbreak of the second war. While Dio states that Trajan built it for easy access into Dacia in case of future trouble, he adds that Hadrian removed the surface work because of anxiety lest the barbarians might overpower the guards and cross into the province of Moesia. Hadrian is known to have contemplated the abandonment of Dacia, and to have been deterred from his project only by anxiety for the Roman settlers there. However, it seems inconsistent that he should retain the province and yet cut off the only sure communication with it. So we are led to look for another motive than the one assigned by Dio for destroying the bridge. This can readily be found in Hadrian's character. Dio tells how on one occasion, when Apollodorus was showing Trajan the plans of the bridge, Hadrian offered suggestions only to be rebuffed by the architect. This insult may well have rankled in the future Emperor's mind, along with a feeling of jealousy at the talents of Apollodorus, and both of these reasons may have led Hadrian not only to destroy the architect, but the bridge as well. Two centuries later, when, in 328, Constantine was making an expedition against the Goths, the arches and roadway were restored, as we learn from the seventh century Chronicon Paschale (page 527). But the later Gothic and Hun invasions made it necessary finally to dismantle it.

Let us briefly see what use Trajan made of the road and bridge in his two wars against the Dacians.

The Dacians, long a source of anxiety to Rome, had become by Trajan's time a real menace. They then occupied lands on either side of the great promontory which the Eastern Carpathian, or Transylvanian Alps, project upon the Danube, the valley of the Temes (Tibiscus), or the present Hungarian Banat, to the west, and little Wallachia, or western Rumania, on the east. But their real strength was centered in the north in the valley of the Marosch (Marisia), the chief eastern tributary of the Theiss, in the great eastern loop formed by the Carpathians, a region now coextensive with Transylvania in eastern Hungary. It was into this region, well guarded by mountains and forests, that the Romans had to penetrate. There were three passes which led into the neighborhood of Sarmizegethusa (the modern Várhely on the Strehl)—one from the west known as the Iron Gate (2,152 feet), which is not to be confused with the Danube rapids already discussed, and two from Wallachia, the Vulcan at the head waters of the Rabon (Schyl), and the Roterturm, further east, at the head of the Aluta (Alt).

appeared in 1872–1874). Duruy gives 16 and Paget 20 (including the end ones).

[12]See the article Ueber Trajan's Steinerne Donaubruecke, in Mittheilungen der Zentralcommission zur Erforschung und Erhaltung von Baudenkmaelern (August, 1858).

[13] Page 132, note 5. Duruy gives the spans of the arches as 120 feet, or 177 feet from their axes, which makes a bridge of 3,720 feet in length, including the end buttresses; Paget gives 3,900 feet; Merivale follows Dio's length of 4,770 Greek feet, i. e. 4630.87 English feet.

[14]Cichorius, Die Reliefs der Trajanssäule, Tafelband II, Pl. LXXII, Nos. 258–261; Textband III, 135 f. (1900).

[15]Cichorius, Tafelband II, Pl. LXXIV; Textband III, 153 f.

[16]Fig. 14, on page 159.

[17]See Dio, 68.14.

[18]Reproduced in Duruy, V, Pt. I, in the figure on page 238.

[19]H. Cohen, Description Historique des Monnaies Frappées sous l'Empire Romaine, II, Nos. 542–544 (1882).

The Dacian Wars, as is well known, furnish insoluble problems. If our knowledge of Trajan's reign is meager, that of these wars, its chief feature, is especially so. Even the causes of the first war are not clear, whether they are to be laid to the aggressive expansion of the military state of Decebalus, or perhaps to the foreign policy of Trajan, which looked both to the safety of the Danube frontier and to the Emperor's own glory. In any case, the Romans easily found a pretext in irritation at the continuance of Domitian's tribute, and in the alliance between Dacia and Parthia. Only one fragment remains of Trajan's narrative of these wars, which we owe to the casual citation of the grammarian Priscian. It seems to have been illustrated, the sketches doubtless forming the basis of the reliefs on Trajan's column. As literary evidence is sadly wanting, the only continuous history being the one preserved in the late abridgement of Dio already mentioned, it is to these reliefs that historians must turn for their chief knowledge of these wars. While localities and the sequence of events as shown by them are largely conjectural, still many details of the two campaigns can here be read. For we see the assembling of Roman armies, encampments, crossings of rivers, battles, sieges, buildings, landscapes, and both Roman and Dacian arms and costumes. Duruy has rightly said that this spiral band of reliefs, which is over 600 feet in length and contains over 2,500 human figures, is 'for the military life of the Romans what Pompeii is for their civil life', for this epic in stone is an accurate mirror of scenes which transpired over 1,800 years ago. Froehner and Cichorius have succeeded in making these events live again before our eyes, and in bringing them into a tolerably sequential narrative, from the crossings of the Danube at the beginning of the first war to the suicide of Decebalus at the close of the second. Modern scholars have done their best to piece together the chief events of the war from these reliefs, but naturally have come to divergent conclusions. Perhaps von Domaszewski has been most successful in sketching their general outline[20].

Trajan left Rome in March, 101, with part of his pretorian guard to meet his legionary force already concentrated on the middle Danube near Viminacium (Kostolatz in Serbia), the headquarters in Upper Moesia of the seventh legion (Claudia). Here two routes were available, one to the north a short distance to Lederata on the river, the other east along the Serbian bank. Trajan in person chose the former, and, having crossed the Danube by a pontoon bridge to the mouth of the Apus (Ipek) near the modern hamlet of Uj-Palanka, marched northward to Tibiscum at the conference of the Tibiscus (Temes) and Bistra (Bisztra). The stations along the route are marked on the Tabula Peutingeriana, and, curiously enough, the few words preserved from Trajan's lost narrative, the Dacia, prove that this was the route of advance. Another army under Laberius Maximus, governor of Lower Moesia, took the eastern route, reaching the Danube at Cuppae (Golubács), and hence apparently followed the rock-hewn road described above, via Taliata (Golubinje?) to a point opposite Tsierna (Orsova), where a crossing was made by a second bridge of boats. Thence he followed the valley of the Tsierna (Cserna) northwards by way of Ad Mediam (Mehadja), finally crossing the lower Carpathians westward by the Tergova Pass and reaching the Tibiscus near the present town of Karansebes just below the ancient Tibiscum.

From Tibiscum the two armies advanced up the gorge of the Bistra toward the Iron Gate, the key to the Marisia (Marosch) valley, and overlooking the Dacian capital. After fruitless overtures of peace by Decebalus, a battle, says Dio, was fought by Trajan, who with Laberius seems to have forced the Iron Gate, at Tapae, a place not yet identified. In this conflict the Romans, though victors, appear to have suffered severely. The reliefs show Trajan visiting the wounded and using his own garments for bandages. The campaigning season now being at an end, Trajan found he had wholly underrated Decebalus's powers of resistance, and so, leaving a guard behind, he withdrew to Drobetae. Here, in the following winter, he learned that the Dacians, with the help of the Sarmatae and the Roxolani horsemen, had crossed the Danube near its mouth into the Dobrudja. He hurried down the river by boat to Oescus and turned south into Moesia to prevent the enemy from crossing the Balkans into Thrace, while it appears that other Roman troops followed the right bank of the river to cut off the barbarians' retreat. Here they surprised the enemy in a night attack, possibly at the spot where later was erected the mysterious monument known as Tropaeum Trajani. In any case the decisive engagement was fought by Trajan himself further south, where the town of Nicopolis ad Istrum (Nicup in Bulgaria) was built on the site of the Roman camp. The next spring the final advance into Transylvania was begun, Trajan wisely throwing a network of defences between the Carpathians and the Aluta, and advancing his columns by several routes. He himself seems to have followed Laberius's route to the Iron Gate, while Lusius Quietus, his Moorish master of horse, starting perhaps from Bononia (Viddin in northwest Bulgaria), crossed the Danube to Drobetae. From here he proceeded in a northeasterly direction across the valley of the Rabon, reaching the river a little below the Vulcan Pass; thence he marched further east to the Aluta, and northward through the Roterturm to Cedoniae (Hermannstadt) on the north side of the mountains. From here he seems to have made a great eastern sweep, finally approaching Sarmizegethusa via Apulum from the north. Again Decebalus sued for peace, but Trajan with the help of Lusius took his capital. The first war then ended with Decebalus acknowledging the suzerainty of Rome and with a Roman garrison left in his capital city. Trajan left for Rome, where in the fall he celebrated a triumph and was given the title of Dacicus — one which was yet to be borne by four Emperors in the next troubled century, by Maximin and his son Maximus, by Decius, and by Aurelian.

The events of the second war are in even greater

[20] Geschichte der Römischen Kaiser, 2. 174 f. (1909). See also Francke, Geschichte des Trajans, 192 f.; H. Schiller, Geschichte der Römischen Kaiserzeit, I, I, 550 f. (1883); and the routes on Kiepert's maps at the end of Volumes 1 and 2 of Cichorius.

obscurity than those of the first. The peace concluded with Decebalus could not last, and soon the Dacian king was again gathering arms, repairing forts, making alliances, and, above all, harassing his northwestern neighbors, the Iazyges, who were now allies of Rome. War was declared by the Senate in 104, and early the next summer Trajan, his bridge now completed, set out by sea from Ancona by way of Corinth, the Aegean, and the mouth of the Hebrus in Thrace, finally resolved to end the Dacian menace forever. On reaching Nicopolis by the military highway built by Augustus he learned that the Dacians had destroyed his works in Little Wallachia. Dio laconically says that the Emperor, having crossed the bridge to Drobetae, 'eventually, after a hard struggle, vanquished the Dacians'. The skillful artist of the reliefs shows the convergent march of the Roman columns on Tapae, and, in the final advance of 106, closing in on the capital. Some of the defenders are shown setting fire to the city, while others have retired to the palace to take poison, and still others have fled. Among the latter is Decebalus, who is pursued northwards into the fastnesses of the Marisia valley, where, to avoid capture when he is finally surrounded, he commits suicide. So the second war ended with the death of the king, the conquest of his kingdom, and its conversion into the Roman provinces of Upper (Transylvania) and Lower (Wallachia) Dacia, the former under an imperial legate, the latter under a procurator, and the thirteenth legion (Gemina) was left as a permanent garrison.

To repair the ravages of war, colonists were collected from Dalmatia, Asia Minor, Syria, and further east—*ex toto orbe Romano*, as Eutropius (8.3) says. Where before there had been one town, now there were four, Apulum (Karlsburg), Napoca (Klausenburg?), and Ulpia Trajana Dacica (the reconstructed Sarmizegethusa) in Dacia Superior, and Tsierna (Orsova) in Dacia Inferior. The new provinces were quickly and lastingly Romanized, as the present Rumanian language, so far separated from its Latin sisters in the west, abundantly testifies. Trajan also built several military roads to connect the chief towns, and the great Via Trajana, which led from the Danube northward along the Aluta and over the Carpathians by the Roterturm Pass, and thence through the Marisia valley across eastern Hungary. This road was to be the later Roman military approach from the west. The older rock-hewn road along the Danube leading to the bridge at Egeta seems thereafter to have been little used. And, as we have seen, the dismantling of the bridge was soon to follow. In fact, both the road and the bridge had done their work in conquering Dacia. Trajan's claim to military glory had been amply proved. But his conquests were not to be lasting. Under Gallienus, in 256 A. D., the Goths crossed the Carpathians, and drove the Romans out except from a few fortresses between the Temes and the Danube. No Roman coin or inscription of a later date has been found in the Dacian region. By the time of Aurelian (270–275 A. D.) even these surviving troops were withdrawn, and were settled in Moesia in the later colony called Dacia Aureliana, which, like the earlier Dacia, was subdivided into two parts, Dacia Ripensis, with Ratiavia as its capital, and Dacia Mediterranea, with Sardica (Sofia) as its official center.

UNIVERSITY OF PENNSYLVANIA WALTER WOODBURN HYDE

A MODERN HYPOCAUST

The hypocaust, so familiar from the numerous remains of Roman baths, seems to have been little used for the general heating of buildings—though passages in Pliny's and Seneca's letters suggest that sometimes hot air was conveyed through hollow floors and walls from the bath-room to other apartments—, until Roman houses began to rise in the inclement climate of Germany and Britain. Not till our own time, apparently, has this ancient Roman method of heating been revived. The magnificent new cathedral in Liverpool is destined, when completed, to be third among the cathedrals of the world, and in beauty and originality of design already ranks among the finest of Church buildings. The work of building, begun in 1904, has progressed so far that on July 19, 1924, the cathedral was consecrated with imposing ceremonies. The finished portion includes the eastern transepts and the central space between, the choir, and behind it the ambulatory and the vestries, with Lady Chapel and chapter-house on either side. The problem of heating has been solved in a new way, and part of the description given in the Official Handbook should be of interest to students of archaeology:

In the year 1920 the Engineers. . .developed and patented a system of heating by means of a warm floor. . . .The method of heating a building by warming the floor was used by the Romans, as may be seen in the baths at Bath and in the Baths of Caracalla at Rome. Here the hot gases and products of combustion from a fire outside the room passed under the floor on their way to a chimney stack. In the Cathedral almost the entire floor space consists of a double floor, enclosing a system of shallow ducts. The warmed air from stoves. . .is circulated through these ducts by an electrically driven centrifugal fan. . . .Under this arrangement the floor of the Cathedral itself becomes an immense radiator, the surface of which is so large compared to that of hot water radiation that the temperature required at its surface is considerably below blood temperature, and for this reason the floor does not feel warm to the feet. The tempering of the marble floor will, however, add to the comfort of the congregation, and, the heating surface being at a very low temperature, there will be no drying of the air. The heat is evenly distributed and down draughts are prevented because the heating surface is the whole floor area of the choir, aisles, and transepts. . . .The heating chamber is situated under the centre of the Cathedral". The floor heating apparatus, hot water boilers, air circulating and ventilating fans are all arranged in the chamber, and provision is made for the apparatus that will be required for heating the nave when that part of the Cathedral is built, the ducts being carried through the temporary wall ready for extension.

This is surely an interesting instance of survival, or revival, of Roman civilization in Britain!

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